SPIDERS PREYING ON *DENDROCTONUS FRONTALIS* (COLEOPTERA: SCOLYTIDAE)[1]

Daniel T. Jennings[2], Herbert Allen Pase, III[3]

ABSTRACT: Two species of spiders, *Platycryptus undatus* (Araneae: Salticidae) and *Verrucosa arenata* (Araneidae), preyed on adults of the southern pine beetle in Texas. These are the first reported observations of spiders feeding on *Dendroctonus frontalis.*

Although spiders are among the dominant predatory arthropods in forest ecosystems, few have been observed preying on destructive bark beetles of the family Scolytidae. Reid (1963) observed a crab spider, *Coriarache* (sic) [= *Coriarachne* (Thomisidae)], feeding on newly emerged adults of the mountain pine beetle, *Dendroctonus ponderosae* Hopkins (= *monticolae* Hopkins), in British Columbia. An oxyopid spider, *Oxyopes scalaris* Hentz (Oxyopidae), and a theridiid spider, *Theridion goodnightorum* Levi (Theridiidae), were observed feeding on adults of the pine engraver beetle, *Ips pini* (Say), in Arizona (Jennings and Pase III 1975). In Europe, Moor and Nyffeler (1984) reported that a species of erigonid spider (Erigonidae) fed on species of *Hylurgops* and *Pityogenes.*

In this paper, we describe observations and collections of two species of spiders feeding on adults of the southern pine beetle, *Dendroctonus frontalis* Zimmermann in southeastern Texas.

On October 22, 1975, the junior author observed salticid jumping spiders on bark of a live loblolly pine, *Pinus taeda* L., at Spurger, Tyler Co., TX. The tree was under attack by southern pine beetles. Four spiders, two with beetle prey, were collected and preserved in vials containing 70% ethanol. Subsequently the senior author identified the spiders as *Metacyrba undata* (De Geer) [now a junior synonym of *Platycryptus undatus* (De Geer), see Hill (1979)] (Salticidae), 3 males, 1 female; the prey was *D. frontalis,* 1 male, 1 female. After collection and preservation, one male spider still grasped its beetle prey (female); the cheliceral fangs were partially embedded in the membranous area between the beetle's pronotum and elytra. The other beetle prey (male) had a puncture wound on the pronotum, possibly inflicted by a spider's fang.

On November 6, 1975, the junior author collected two orb-weaving spiders with southern pine beetle prey in their webs at Spurger, Tyler Co., TX. The spiders and beetle prey were: *Verrucosa arenata* (Walck.)

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[2]Northeastern Forest Experiment Station, USDA Building, University of Maine, Orono, Maine 04469.

[3]Texas Forest Service, Lufkin, Texas 75901.

(Araneidae), 2 females; *D. frontalis,* 3 males. One beetle had been wrapped in silk; the remaining two beetles were unwrapped, possibly indicating recent capture.

Spiders and beetle prey are deposited in the arachnid collection of the U.S. National Museum, Washington, D.C.

The salticid *P. undatus* is a common species found throughout the eastern half of the United States (Barnes 1958); apparently the collections from Tyler County represent new county records. Kaston (1948, 1981) noted that *Marpissa undata* (De Geer) [now a junior synonym of *Metacyrba undata* (De Geer), see Barnes (1958) and *Platycryptus undatus* (De Geer), see Hill (1979)] had been taken from loose bark of trees, but the trees were not identified. Howden and Vogt (1951) found this spider under loose bark of dead and dying Virginia pine, *Pinus virginiana* Mill., in Maryland; scolytid pitch tubes were abundant on the trees. In a survey of the fauna inhabiting the bark of loblolly pine and shortleaf pine, *P. echinata* Mill., in North Carolina, Ramsey (1941) collected 16 *P. undatus.*

This jumping spider frequently is observed on the bark of southern pines in east Texas. We have not observed *P. undatus* on the bark of hardwood trees, but undoubtedly it occurs there also.

The orb weaver *V. arenata* is found in the eastern United States from New York State southward to Panama. This species is commonly found in woods where the spider builds a vertical web and retreat (Levi 1976). Unlike most orb weavers, females of *V. arenata* orient with their anterior ends up in webs (Kaston 1981). Peck *et al.* (1971) collected this spider from shortleaf and loblolly pines in Arkansas. In late summer and early fall, webs of *V. arenata* are common in mixed pine-hardwood forests of east Texas.

Our observations and collections are the first recorded examples of spiders preying on adults of the southern pine beetle. Spiders were not included in the lists of known predators of *D. frontalis* given by Overgaard (1968), Moore (1972), or Berisford [1980]. The southern pine beetle is most susceptible to predation by spiders during the beetle's emergence, dispersal, and attack phases. Hunting spiders most likely kill *D. frontalis* beetles when the beetles are emerging from host trees or when they are attacking new host trees. Because bark beetles fly during dispersal, web-building spiders are most likely their captors. Deployment of bark-beetle pheromones near spider webs may attract potential prey, including bark beetles and their parasites and invertebrate predators. This potential method of enhancing spider predation needs further investigation.

No doubt forest entomologists have overlooked or ignored spider predation as a potential source of bark beetle mortality in the past. Numerous species of hunting spiders are corticolous in habit, e.g., species of *Coriarachne, Orodrassus, Metaphidippus, Philodromus,* and others. Web-building species of *Araneus, Theridion,* and *Dictyna* build their aerial

traps on or suspended from tree foliage. Bark beetles, and perhaps some of their natural enemies (De Leon 1934), are susceptible to spider predation during the beetle's flight or dispersal period (Jennings and Pase III 1975; Moeck and Safranyik 1984). The frequency and impact of spider predation on bark beetle populations and their natural enemies need further investigation.

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